

## REMARKS

In amended FIG. 4, the letter u has been replaced by the Greek letter  $\mu$ .

Claims 1 and 5 have been amended to more correctly reflect the invention. Support for the amendment can be found at p. 4, 10-15.

New claims 8 -10 have been added. Support for new claims 8 and 9 is found at p. 5, 3-7. Support for new claim 10 is found at p. 6, 5-14. No new matter has been added.

Rejection under 35 USC §103

Claims 1, 3, and 4 are rejected under 35 USC §103(a) over Kress (4,419,578) in view of Carron (5,399,863) and Newacheck (5,334,840). Applicant traverses the rejection.

The invention claims a device (Claim 1) and method (Claim 5) for detecting neutrons. The device comprises a body of hexagonal boron (hBN) disposed between electrodes oriented so as to produce an electric field parallel to a crystallographic axis of the hBN, wherein the crystallographic axis is the c- axis of hBN, and means for detecting the current pulse produced when the device is exposed to a neutron flux.

Kress teaches a solid state neutron detector comprising a neutron-sensitive first material layered on top of a semiconducting second layer containing hydrogen (col. 3, 26-30). The first material may be neutron sensitive or may be enriched with a third material that is neutron sensitive and may or may not contain hydrogen. (col. 3, 42-45. The semiconducting second material can be any straight chain or branched semiconducting

hydrocarbon, hydrogen compensated amorphous silicon or any other semiconductor that contains hydrogen.

Carron discloses a device for detecting thermal neutrons comprising a layered structure alternating between boron layers and CCD arrays (col. 2, 14-17). In operation, the CCD, collecting charge from electron-hole pairs formed by reaction with energetic particles produced by neutron interaction with boron, produces an electric impulse (col. 2, 23-25 and col. 3, 3-65).

Newacheck discloses a neutron detector comprising carbon infiltrated hBN coupled to a scintillation counter.

Rejection of claims 1, 3 and 4 appears to be based on the assertion that the boron-base materials (e.g., hBN) could be used as the neutron-sensitive first material of Kress. That notwithstanding as shown above, Kress teaches a duplex structure for his neutron detector, wherein the second semiconductor layer contains hydrogen, a limitation neither taught nor claimed by the invention. By use of a duplex structure, Kress takes an entirely different approach to neutron detection than that claimed. Moreover, the claimed limitation that an electric field is applied parallel to a crystallographic axis further distinguishes the claimed invention over Kress.

It is well settled that to establish the prima facie obviousness of a claimed invention all the claim limitations must be taught or suggested by the prior art. The prior art must disclose the invention as a whole. As Applicants have shown above, Kress neither teaches nor suggests the claimed invention. Applicants urge that a prima facie case of obviousness

has not been made and accordingly request reconsideration and withdrawal of the rejection of claims 1, 3 and 4 and claims 2, 4 and 7 dependent therefrom.

Claim 5 is rejected under 35 USC §103(a) over Poignant Jr. (3,887,807) in view of Newacheck.

The neutron detecting device of Poignant comprises (FIG. 2) a first layer which is an electrically conducting layer, a second which is an insulative charge accepting layer, a third layer which is an insulative charge accepting layer, a fourth layer which is a neutron sensitive layer which will produce secondary emissions when struck by ionizing radiation, and a fifth layer similar to the first (col. 9, 52-67). Neutron detection is by generation of a charge pattern (col. 9, 60-67) on the insulating layer.

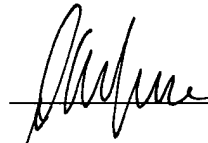
Claim 5 having been amended to add the limitation that neutron detection is by means of a current pulse, rejection under 35 USC §103(a) cannot be sustained since a prima facie obviousness rejection requires all claim limitations be taught. Applicants therefore, respectfully request reconsideration and allowance of Claim 5 and Claim 6 dependent therefrom.

## CONCLUSION

The rejection of claims 1-7 under 35 USC §103(a) having been overcome, Applicant respectfully requests reconsideration and withdrawal of the rejection, entry of new claims 8-10 and that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

Date: 09/18/2003




Donald A. Nissen  
Registration No. 44,261  
Sandia National Laboratories  
P. O. Box 969, MS 9031  
Livermore, CA 94551-0969  
Telephone (925) 443-7535

## Certificate of Mailing Under 37 CFR §1.8

I hereby certify that this Correspondence and documents referred to herein were deposited with the United States Postal Service as first class mail addressed to: Assistant Commissioner of Patents, Washington, D. C. 20231 on the date shown below.

Date of Deposit: 9-24-03

Person making Deposit Liz Martinez Signature 

Application Number: 09/967,143

For Applicant: Doty